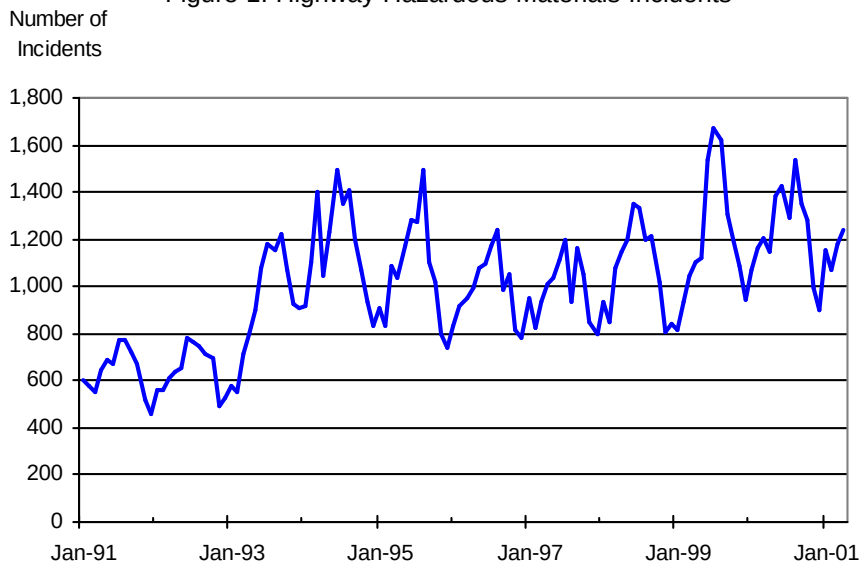
AN ANALYSIS OF HIGHWAY HAZARDOUS MATERIALS INCIDENTS

The hazardous materials transportation safety program relies on the Department of Transportation's Hazardous Materials Incident Report to gather basic information on incidents that occur during transportation and that meet specified criteria as required in the Federal hazardous materials transportation law. Part 171 of Title 49, Code of Federal Regulations (49 CFR) contains the incident reporting requirements of carriers of hazardous materials.

An 'incident' is reported if there is any unintentional release of hazardous material while in transportation, which includes loading, unloading and temporary storage. Since most reported incidents occur on the highways, the highway hazardous material incidents were selected as a focus of study. Figure 1 illustrates the monthly hazardous materials incidents experienced on highways for the past decade.

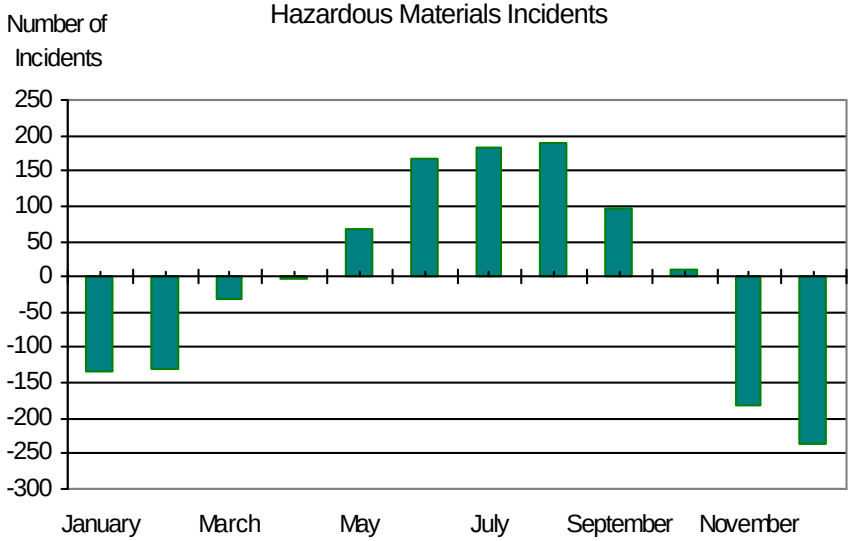
Figure 1. Highway Hazardous Materials Incidents



An initial examination of the data displayed in Figure 1 shows some degree of an increase of the number of incidents. But does this indicate a continuing increase, or rather a shift upwards to achieve a new stable level of incidents in the long run? To first answer this question, the seasonal component needs to be removed.

As is true for most transportation data, the highway incidents exhibit strong seasonal variation. Decomposition of the time series data provides a means for viewing the long-term behavior on the data separately from the seasonal component of the data. Analysis of the data revealed that the monthly seasonality is relatively consistent through the years; therefore, it is appropriate to average the same months over time to show the average monthly variation. Figure 2 provides the result of that analysis.

Figure 2. Monthly Seasonal Variation for Highway Hazardous Materials Incidents



The results in Figure 2 are not surprising; the summer months experience a higher than average number of incidents, whereas the winter months reflect a lower than average number of incidents. This seasonal pattern is similar to what was measured for highway VMT, or Vehicle Miles Traveled (see Transportation Indicators, September 2001, Special Section). The graph of the monthly seasonal variation for highway VMT is provided in Figure 3.

AN ANALYSIS OF HIGHWAY HAZARDOUS MATERIALS INCIDENTS (continued)

Figure 3. Monthly Seasonal Variation for Highway VMT

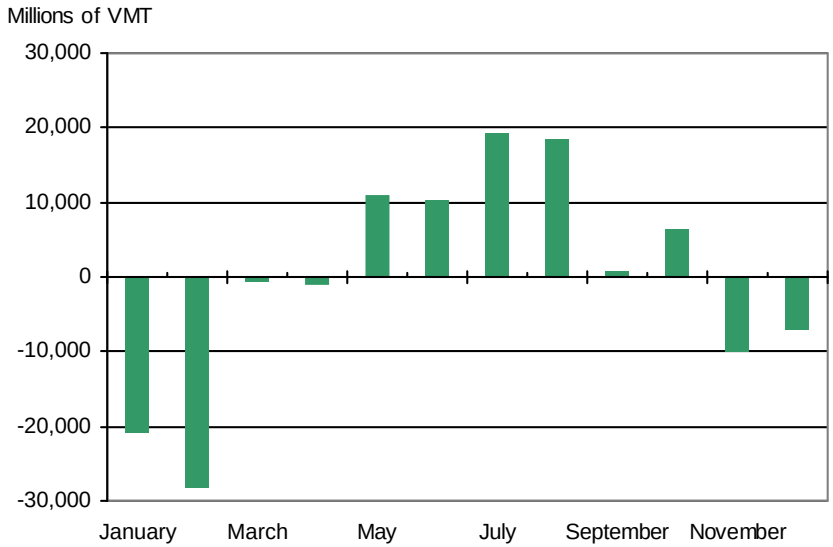
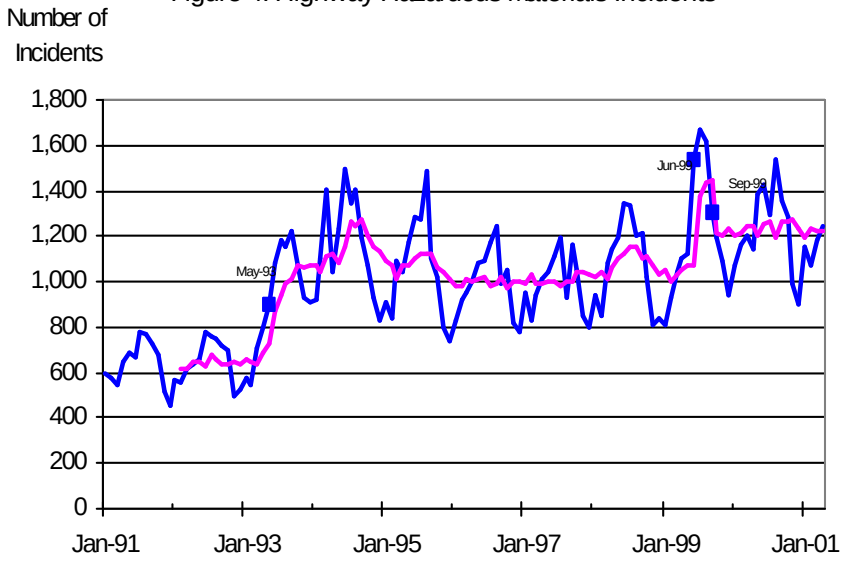


Figure 4. Highway Hazardous Materials Incidents



VMT exhibits the peaks in summer and the troughs in winter, but the winter low points occur more in January and February than in November and December (The low months for highway hazardous materials are November and December). Further research will be needed to explain this slight difference in seasonal patterns; one possible explanation might be that hazardous materials incidents generally involve freight movement, whereas highway VMT, as shown above, measures both passenger and freight movement.

The underlying trend of the data, which has been separated from the seasonal and irregular components, is now shown in Figure 4. The analysis of the trend does not point to a constant increase from one year to the next in that data. Rather, the data indicate a stable level from 1991 to mid-1993. A sharp increase occurs around May 1993, and then a new level is experienced through mid-1999. After a momentary spike from June to September 1999, a new level is reached for the remaining months.

Some of these pronounced shifts might be attributed to changes in reporting requirements. Beginning in April 1993, there was a sharp improvement in the reporting of incidents by small package carriers (possibly brought about by an OSHA action against one of the top carriers). This could be the explanation for the first shift upwards around May 1993. At present, we do not have an explanation for the increase that occurred in 1999. Intrastate motor carriers were required to start reporting incidents in October 1998, but the number of incidents from these small carriers does not appear to be great enough to cause the shift experienced in 1999. Additional research will be needed to specify a potential cause for such a change.

The resultant trendline for hazardous materials incidents on highway, displayed in Figure 4, is also shown in the main body of this report (page 18). This trendline will be updated monthly as new data arrive. Similar analyses will be performed on additional indicators throughout the year.